



LAYING THE GROUNDWORK

TIPS ON CABLES AND CONNECTORS FOR YOUR AUDIO INSTALLATION

by Joseph C. DiBenedetto

The time has come. There's just no way around it and you've been putting it off for far too long. That's right, it's time to take the plunge and start preparations on the audio installation for your facility.

Whether it's a brand new installation or you're just revamping an older system, the tendency will be to focus most of your attention on the bells and whistles associated with an audio installation — microphones, speakers, consoles, amplifiers, etc. However, before you start frantically searching for the perfect speaker, here's a word to the wise — put as much thought into the cables and connectors you select, otherwise, that perfect speaker may wind up looking better than it sounds.

CABLE

Cable is just cable, isn't it? No. Simply put, selecting the proper cable can be critical to audio performance by providing proper noise rejection and minimal signal loss in transmission from source to destination.

"Microphones create a very low-voltage signal, and because of that, they are very susceptible to external interference from RF [Radio Frequency] transmissions, power lines or even cell phones," stated Scott

Fehl, Product Manager at Gepco International, a leader in manufacturing broadcast and studio audio/video cables. "The amplitude of the external interference that can be induced into the cable can be close in level to the original microphone signal, so it's important to use cables that have good noise rejection to keep the external interference out."

NOISE REJECTION

Noise rejection, one of the most important factors when selecting cable for your installation, is achieved through how consistent and tightly the two conductors inside the cable are twisted. Generally, you should purchase cable with fairly high twists-per-foot. The tighter the twist and the more consistent the twisting, the better the cable's noise rejection will be.

"You want to make sure that you keep the hum and RF out of the cable," Fehl continued, "so precision twisting and matched capacitance are important in achieving that. Cable manufacturers, like Gepco, have very strict and consistent quality standards and specifications that help meet these installation necessities."

Shielding works in conjunction with twisting to help improve noise rejection. While twisting offers a reasonable amount of rejection by itself, the shielding adds to and extends the frequency range of the noise rejection. Foil and braided shields both work well, but each has its pluses and minuses.

Braided shields have excellent rejection and flex-life (depending upon the construction and coverage), but they are also more expensive than the alternative. Cables with braided shields are ideal in applications that will see a fair amount of flexing and portable use, especially in single twisted-pair type cables (e.g. portable microphone cables).

Foil shields are cost effective and offer the best high-frequency rejection. Ideal for permanent installation, they also work well in multi-pair designs where the combined strength of the pairs and outer jacket increase the overall structural integrity of the cable. However, one of the greatest attributes of a foil-shielded cable is the ease of termination. Foil-shielded cables with a drain wire offer a quick and simplified method for terminating the shield of the cable to a connector.

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EASE OF TERMINATION

Although the shield type is a primary factor in determining ease of termination, many other parameters play a role as well. According to Fehl, "Gepco optimizes all of its cable designs for easy termination. This includes everything from the shield type to jacket construction and mechanical properties of the dielectric."

When selecting cable, you should always keep in mind its user friendliness, termination requirements, budget and application. If the wrong type or an inferior quality of cable is specified, you will pay for it in the long run by either having to replace the cable or substantially adding to the labor cost and installation time.

CONDUCTOR TYPE

The longer the run, the more attenuation you will have in the cable. In order to limit attenuation, you'll want to be mindful of the gauge of the wire, or the size of the conductor. For long runs, 22 or 24 gauge is preferred. Twenty-two and 24 gauge wires have greater cross sectional areas than 26 gauge, so they have less DC resistance, which means there will be less loss through the wire. If you are soldering to a multi-pin connector or patchbay, 24 or 26 gauge is the best choice, since they are easier to manage in small spaces. If you are using a Neutrik XLR or similar type connector, there's no discernable difference in the level of soldering required, so you should stick with the gauge that provides lower attenuation.

CONNECTORS

While on the subject of connectors, how you connect the end product or connector can play a significant role on the success of the installation. "To help prevent cross-talk or inductive pickup in an audio or video connector, keep power and signal connections separate and unless

you have a connector specifically designed for this application, use a connector dedicated to signal and a separate connector dedicated to power," says Fred Besnoff, Product Applications Manager for Neutrik USA, manufacturers of connectors and accessories for the professional audio industry.

Problems associated with improper connection to the end product or connector include: hum or static caused by a poor termination; conductor or product overheating as a result of choosing the wrong size conductor and/or improperly matching it to the wrong size contact; and signal degradation or degradation in RF performance produced by mismatching your RF connectors or connections.

DIELECTRIC

Along with twisting and shielding, the dielectric is an instrumental factor in the performance of the cable. The dielectric in the cable is the insulation that coats each conductor, electrically separating the conductors from each other and the shield. When the signal travels down the copper conductor, it will actually be "absorbed" through the dielectric and into the shield. This occurs to a greater effect at higher frequencies. Typically, you should look for a dielectric with a low k constant.

"For the dielectric, you should choose a solid polyethylene, foam polyethylene or foam polypropylene compound," Fehl explained. "Stay away from PVC-type compounds because the dielectric constant is higher. The lower the dielectric constant, the lower the high-frequency attenuation."

It might only be cable and connectors, but putting some extra thought into which type you select might just be the first step to a successful installation. ♦

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XLR Cable Connector
NEUTRIK USA
www.neutrik.com
732-901-9488

Cables and Connectors
GEPCO INTERNATIONAL INC.
www.gepco.com
1-800-966-0069